Sargodha Board Group-I *(First Annual Examination 2025)*

1225 Warning:- Please write your Roll No. in the space provided and sign. **Roll No ____**

(Inter Part - II) **(Session 2021-23 to 2023-25)** **Sig. of Student ____**

Mathematics (Objective) **Group - I** **Paper (II)**

Time Allowed: 30 minutes **PAPER CODE 4195** **Maximum Marks: 20**

Note: You have four choices for each objective type question as A, B, C and D. The choice which you think is correct; fill that circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question. Write PAPER CODE, which is printed on this question paper, on the both sides of the Answer Sheet and fill bubbles accordingly, otherwise the student will be responsible for the situation. Use of Ink Remover or white correcting fluid is not allowed.

Q1.

1. $\int_0^1 |x|dx =$ ____ (A) 0 (B) $\frac{1}{2}$ (C) $-\frac{1}{2}$ (D) 1

2. **$y = \text{Tan}x + c$ is the solution of the differential equation.**
(A) $\cos^2 x\frac{dy}{dx}=1$ (B) $\sec^2 x\frac{dy}{dx}=1$ (C) $\frac{dy}{dx}=\text{Tan}\,x$ (D) $\text{Tan}\,x\frac{dy}{dx}=1$

3. **If $f(x)=\sqrt{x+4}$, then f $(x-1)$is equal to ____:**
(A) $\sqrt{x-3}$ (B) $\sqrt{x+3}$ (C) $\sqrt{x-1}$ (D) $\sqrt{x+5}$

4. $\lim_{x\to 0}(1+x)^{1/x} =$ ____. (A) 0 (B) 1 (C) e (D) ∞

5. **The derivative of x^2 w.r.t 4x is____:** (A) $\frac{1}{2}x$ (B) 2 (C) 4 (D) $\frac{2}{x}$

6. **If $f(x) = e^{5x}$, then $f'(0) =$ ____** (A) e (B) $5e$ (C) 5 (D) 0

7. $x - x^3/3! + x^5/5!$ ..... **is the Maclaurin series of the function:**
(A) e^x (B) $\ln(1-x)$ (C) $\cos x$ (D) $\sin x$

8. $\frac{d}{dx}\left(\frac{1}{a}\text{Tan}^{-1}\frac{x}{a}\right) =$ ____
(A) $\frac{1}{a^2+x^2}$ (B) $\frac{1}{a^2-x^2}$ (C) $-\frac{1}{a^2+x^2}$ (D) $-\frac{1}{a^2-x^2}$

9. **$xdy + ydx$ is the differentials of function____:**
(A) $x+y$ (B) $x-y$ (C) x/y (D) xy

10. $\int\frac{1}{\sqrt{a^2-x^2}}dx =$ ____ (A) $\frac{1}{a}\sin^{-1}\frac{x}{a}+c$ (B) $\frac{1}{a}\cos^{-1}\frac{x}{a}+c$ (C) $\sin^{-1}\frac{x}{a}+c$ (D) $\cos^{-1}\frac{x}{a}+c$

11. $|\cos\alpha\, i + \sin\alpha\, j + 0k| =$ ____ (A) 0 (B) $\cos 2\alpha$ (C) 1 (D) $\text{Tan}\,\alpha$

12. $3i \cdot 4j \times 5k =$ ____ (A) 3 (B) 4 (C) 5 (D) 60

13. **If the distance of the point (x,4) from the origin is 5, then what is the value of x?**
(A) 0 (B) 1 (C) 2 (D) 3

14. **The inclination of the line $x - 2 = 0$ is:**
(A) 0 (B) $\pi/2$ (C) $\pi/3$ (D) $\pi/6$

15. **The point intersection of the lines $x - y = 0$ and $2x+y = 0$ is ____**
(A) (0,0) (B) (1,2) (C) (1,1) (D) (0,1)

16. **Which one of the following is a feasible solution of the inequality $5x+y<12$.**
(A) (–1, 6) (B) (1, –2) (C) (1,2) (D) (–1, –2)

17. **The radius of the circle $x^2+y^2 = 18$ is:**
(A) $2\sqrt{3}$ (B) $3\sqrt{2}$ (C) $3\sqrt{3}$ (D) $2\sqrt{2}$

18. **The circle $x^2 + y^2 + 2gx + 2fy + c = 0$ passing through origin if:**
(A) $g = 0$ (B) $f = 0$ (C) $c = 1$ (D) $c = 0$

19. **The axis of the parabola $(x-1)^2 = 8(y-2)$ is____:**
(A) $x = 0$ (B) $y = 0$ (C) $x = 1$ (D) $y = 2$

20. **The projection of $i + 3j + 4k$ along the vector i is____**
(A) 1 (B) 3 (C) 4 (D) $1/\sqrt{26}$

1225 Warning:- Please do not write anything on this question paper except your Roll No.

Mathematics(Subjective) **(Group - 1st) (Inter Part - II)** **Paper (II)**

Time Allowed: 2.30 hours **(Session 2021-23 to 2023-25)** **Maximum Marks: 80**

SECTION - I

Q2. Answer briefly any Eight parts from the following: **8×2=16**

(i) Prove that $\cosh^2 x - \sinh^2 x = 1$ **(ii)** For $f(x) = -2x + 8$, find $f^{-1}(x)$. **(iii)** Evaluate $\lim_{x\to 2} \frac{\sqrt{x}-\sqrt{2}}{x-2}$ **(iv)** Determine whether the function $f(x)=x^{2/3}+6$ is even or odd. **(v)** For real valued functions $f(x)=\sqrt{x+1}, g(x)=\frac{1}{x^2}, x\neq 0$, Find $fog(x)$ and $gof(x)$. **(vi)** Find $\frac{dy}{dx}$ from first principle if $y = x^m$, $m\in N$

(vii) If $y=\sqrt{x}-\frac{1}{\sqrt{x}}$, show that $2x\frac{dy}{dx}+y=2\sqrt{x}$ **(viii)** Differentiate $\tan^3\theta.\sec^2\theta$. with respect to θ.

(ix) Find $f'(x)$ if $f(x) = x^3\cdot e^{\frac{1}{x}}$ **(x)** Find y_2 if $y = x^2e^{-x}$ **(xi)** Apply Maclaurin series expension to prove that $\ln(1+x) = x - \frac{x^2}{2}+\frac{x^3}{3}-\frac{x^4}{4}+\ldots..$ **(xii)** Find the extreme values for the function $f(x) = x^3 - 6x^2 + 9x$

Q3. Answer briefly any Eight parts from the following: **8×2=16**

(i) Find dy and δy, where $y=\sqrt{x}$ when x changes from 4 to 4.41. **(ii)** Evaluate $\int \cos 3x \sin 2x\,dx$

(iii) Find $\int a^{x^2}.x\,dx, a>0, a\neq 1$ **(iv)** Solve the differential equation $x^2(2y+1)\frac{dy}{dx}-1=0$ **(v)** Find the area between the x-axis and the curve $y=\cos\frac{1}{2}x$ from $x=-\pi$ to $x=\pi$ **(vi)** Evaluate the difinite integral $\int_1^2 \ln x\,dx$

(vii) Evaluate $\int x\sqrt{x^2-1}\,dx$ **(viii)** Find the points three-fifth of the way along the line segment from A (–5, 8) to B (5,3). **(ix)** Find an equation of the line through (–2, 5) having slope undefined. **(x)** The coordinates of three points are A (2,3), B (–1,1) and C(4,–5). By computing area bounded by ABC, check whether the points are collinear. **(xi)** Find measure of the angle between the lines represented by $2x^2+3xy-5y^2=0$

(xii) The xy-coordinate area are translated through the point O' (4, 6). The coordinates of the point P are (2,–3) referred to the new axes. Find the coordinates of P referred to the original ones.

Q4. Answer briefly any Nine parts from the following: **9×2=18**

(i) Define a feasible region. **(ii)** Graph the solution set of linear Inequality $5x - 4y \leq 20$ **(iii)** Find the centre and radius of a circle $5x^2+5y^2-24x+36y+10=0$ **(iv)** Find the Equation Tangent to circle $x^2+y^2=25$ at (4,3) **(v)** Find focus and vertex of parabola $y^2 = -12x$ **(vi)** Find the equation of parabole with Focus (–3, 1), directrex x=3. **(vii)** Find convertices of ellipse $4x^2+9y^2=36$ **(viii)** Find a unit vector in the same direction of the $\overline{V}=[3,-4]$ **(ix)** Find the sum of vectors $\overline{AB}$ and $\overline{CD}$ given four points A(1,–1), B (2,0), C (–1, 3) and D(–2, 2). **(x)** Find a constant α, so that $\overline{V}=\hat{i}-3\hat{j}+4\hat{k}$ and $a\hat{i}+9\hat{j}-12\hat{k}$ are parallel. **(xi)** Find a scalar a, so that $2\hat{i}+a\hat{j}+5\hat{k}$ and $3\hat{i}+\hat{j}+\alpha\hat{k}$ are perpendicular. **(xii)** Find a vector perpendicular to each of the vector $a=\bar{a}\,\hat{i}-\hat{j}+\hat{k}$, $\bar{b}=4\hat{i}+2\hat{j}-\hat{k}$ **(xiii)** Find the value of $3\hat{j}\cdot 4\hat{k}\times\hat{i}$

SECTION - II

Note: Attempt any THREE questions. **(3×10=30)**

Q5. (a) Evaluate $\lim_{\theta\to 0}\frac{1-\cos p\theta}{1-\cos q\theta}$ **(b)** Differentiate w.r.t "x" $\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right)$ 5,5

Q6. (a) If $x=\sin\theta$, $y=\sin m\theta$, show that $(1-x^2)\frac{d^2y}{dx^2}-x\frac{dy}{dx}+m^2y=0$ **(b)** Evaluate $\int\frac{\sqrt{2}}{\sin x+\cos x}dx$ 5,5

Q7. (a) Graph the feasible region for the system of inequalities and also find all corner points: 5
$x+y\leq 5, -2x+y\leq 2, x\geq 0, y\geq 0$

(b) Solve the differential equation $\frac{ds}{dt}+2st=0$ 5

Q8. (a) Find an equation of the chord of contact of the tangents drawn from (4,5) to the circle $2x^2+2y^2-8x+12y+21=0$ 5

(b) Find equation of two parallel lines perpendicular to 2x–y+3=0 such that the product of the x-and y-intercepts of each is 3. 5

Q9. (a) Find the centre, foci, eccentricity and directrix of the ellipse $25x^2+4y^2-250x-16y+541=0$ 5

(b) Prove that $\cos(\alpha-\beta)=\cos\alpha\cos\beta+\sin\alpha\sin\beta$ 5